Patient Perceptions of Provider and Hospital System Factors Associated with New Medication Communication During Hospitalization

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Abstract

This research examined provider and hospital factors associated with patients' perceptions of how often explanations of new medications were "always" given to them, using Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. HCAHPS results were obtained for October, 2012 - September, 2013, from 3,420 hospitals and combined with a Magnet-designated hospital listing. Multiple regression examined correlates of new medication communication, including healthcare provider factors (perceptions of nurse and physician communication) and healthcare system factors (Magnet designation, hospital ownership, hospital type, availability of emergency services, and survey numbers). Nurse and physician communication were strongly associated with new medication communication (r= 0.819, p<0.001; r= 0.722, p<0.001, respectively). Multivariable correlates included nurse communication (p<.001), physician communication (p<.001), hospital ownership, availability of emergency services, and survey numbers. There was a significant relationship between patients' perceptions of nurse and physician communication and the explanations they had received about their new medications during hospitalization.

Poor communication about new medications can increase the risk for medication-related errors, especially across transitions in care (Coleman & Berenson, 2004; Kripalani et al., 2007). As many as two thirds of patients report they received new medications in the hospital (Olson & Windish, 2010), but about 30% of these people are nonadherent after they are discharged from the hospital (Barber, Parsons, Clifford, Darracott, & Horne, 2004). For those who are newly prescribed medications, about 60% report a desire for more information within 10 days of starting the medication (Barber et al., 2004), including information about side effects, basic medication-taking instructions, and drug interactions (Krueger & Hermansen-Kobulnicky, 2010). Consistently providing medication information to patients in a way that is understandable during their hospital stay is important for promoting safe medication-taking behaviors and medication adherence after hospital discharge.

Patients Perceptions of Medication Communication

Understanding patients' perspectives on their hospital experience is essential for understanding the healthcare provider and system factors that may be influencing the quality of information and the frequency with which patients are provided information about new medication prescriptions (hereafter referred to as "medication communication"). Patients' perceptions are measured nationally using the Consumer Assessment of Healthcare Providers and Systems (HCAHPS) hospital survey. *Communication about Medication* is one quality domain measured by the HCAHPS survey that reflects the percent of hospitalized patients' who perceive they were always told the purpose of new medications and side effects were always described in a way that was understandable to them. Despite HCAHPS survey results being publicly reported,

little change in medication communication scores has occurred over the last five years; in particular, only 65% of the time did patients report they were “always” provided information about new medications prescribed in the hospital (Centers for Medicare & Medicaid Services, 2011, 2012b, 2013, 2014b, 2015b).

Healthcare provider factors likely to influence medication communication include nurse communication and physician communication. Nurses and physicians provide much of the information patients receive about their new medications while in the hospital. Effective communication involves active listening skills, being courteous and respectful, and explaining things in a way that patients can understand. Effective communication between patients and clinicians is associated with positive patient outcomes, including patients’ ability to recall information and to be adherent to treatment recommendations (Cooper et al., 2009; Zolnierek & DiMatteo, 2009). Furthermore, collaborative communication that emphasizes shared decision-making between provider and patient is associated with patient activation and medication adherence (Kuntz et al., 2014; Parchman, Zeber, & Palmer, 2010). Patients have stated that provider communication is important to medication communication (Tarn, Paterniti, Williams, Cipri, & Wenger, 2009).

Healthcare system factors likely to influence medication communication are related to the work environment: type of hospital, ownership of the hospital, and Magnet designation. In hospital work environments where care delivery is relatively collaborative, patients rate medication communication and the hospital overall more positively (Kutney-Lee et al., 2009). Better quality nurse work environments with better nurse staffing and high nurse job satisfaction (Clark, Leddy, Drain, & Kaldenberg, 2007)

are associated with increased patient satisfaction (Boev, 2012). There is some evidence that Magnet-designated hospitals perform better on HCAHPS than non-Magnet hospitals (Chen, Koren, Munroe, & Yao, 2014; Kidd, 2013), further supporting a potential association between the work environment and patients' perceptions of care, including medication communication.

Purpose

The purpose of this study was to examine the respective relationships of patient perceptions of healthcare provider and system factors with medication communication. The hypothesis was that healthcare provider communication and hospital system factors would be positively related to medication communication (see Figure 1).

Methods

Study Design

This was an analysis of cross-sectional data merged from two sources: the HCAHPS hospital survey in participating hospitals and the American Nurses Credentialing Center's list of Magnet hospitals (American Nurses Credentialing Center, 2015a). Data were combined from these two sources using hospital identifying information found in both data sources. The University Institutional Review Board waived review of this study.

Data from the HCAHPS survey were collected between October 1, 2012, and September 30, 2013. The HCAHPS survey is the first national, standardized, and publicly reported survey designed to measure patients' perceptions of their hospital care experiences. It was developed by the Centers for Medicare and Medicaid Services (2014a) in partnership with the Agency for Healthcare Research and Quality. The 32-

item HCAHPS hospital survey is used at all Medicare-participating hospitals.

Data were reported by adult patients aged 18 years or older with at least one overnight stay in the hospital. Patients discharged to nursing homes, skilled nursing facilities, or hospice care were not surveyed. The sampling approach for HCAHPS surveys is detailed elsewhere (Centers for Medicare & Medicaid Services, 2012a). Using these data, the unit of analysis is the hospital level. The publicly reported HCAHPS hospital survey results are adjusted for mode of survey administration and patient mix (Giordano, Elliott, Goldstein, Lehrman, & Spencer, 2009).

HCAHPS measures

Medication Communication. The measure of communication about medicines is the percent of patients who perceived staff "always" (1) told them what the medication was for and (2) explained about medication side effects in an understandable way.

Nurse Communication. Nurse communication represents patient perceptions of how often nurses (1) treated the patient with courtesy and respect, (2) carefully listened, and (3) explained things in an understandable way (hereafter described as *nurse communication*). The "always" responses are considered the target score, also known as the "top-box" score, which is the score that is publicly reported. For this analysis, the percent of returned surveys in which a rating of "always" was scored for nurse communication was used as a variable.

Physician Communication. Similarly, physician communication represents patient perceptions of how often physicians (1) treated the patient with courtesy and respect, (2) carefully listened, and (3) explained things in an understandable way

(hereafter described as *physician communication*). We used the percent of "always" responses as a measure of physician communication.

Hospital Characteristics. Hospital characteristics include Magnet designation, hospital ownership, hospital type, and whether the facility had emergency services. Additionally, survey response rates and number of completed surveys were included variables.

***Magnet Designation*.** Magnet designation is a voluntary application and external peer review process as part of a program through the American Nurses Credentialing Center (American Nurses Credentialing Center, 2015b). Becoming a Magnet-designated hospital includes a self-assessment to evaluate structures and processes within the hospital that demonstrate nursing excellence as well as an external review of documentation and an onsite-visit. Magnet designation is for a period of four years, at which time the hospital must resubmit documentation for review and, if found satisfactory, then undergoes another onsite review (American Nurses Credentialing Center, 2015c). Thus, ongoing Magnet designation requires consistent and long-term demonstration of excellence in nursing practice. Magnet designation is a reflection of nursing excellence. We used a dichotomous variable to code hospitals designated as Magnet or not Magnet.

Hospital Ownership. Hospital ownership was a categorical variable with ownership types designated as one of the following: Voluntary non-profit; Private, government; Federal, government; Hospital district or authority, government; Local, government; State; Physician; Proprietary; Voluntary non-profit; Church; Voluntary non-

profit; Other. These are ownership designation types reported along with the HCAHPS survey results.

Hospital Type. Hospital type includes either acute care hospital or critical access hospital. These designated types are based on conditions set forth by Medicare guidelines. A critical access hospital is a smaller hospital with fewer than 25 short-stay (96 hours or less) inpatient beds with emergency care and located in a rural area (U.S. Department of Health and Human Services Health Information Technology, n.d.). Acute care hospitals are larger hospitals. In order for acute care hospitals that participate in the Inpatient Prospective Payment System (IPPS) to receive their full annual payment, they must collect and submit HCAHPS data (Centers for Medicare & Medicaid Services, 2014a). Failing to participate can result in an annual payment reduced by 2.0 percentage points. Critical access hospitals may voluntarily participate in HCAHPS (Centers for Medicare & Medicaid Services, 2014a).

Emergency Services. Emergency services was classified as a dichotomous variable with options of “yes” or “no” and reported along with the HCAHPS survey data.

Data Analysis

All data were examined for missing values or for low response rates that were considered unstable. The HCAHPS data contained footnotes indicating which items had low response rates; these were excluded from our analysis. Descriptive statistics appropriate for the measurement level (e.g., frequencies and percentages for nominal/ordinal; mean and standard deviation for quantitative variables) were used. The statistical comparisons between hospital system categorical characteristics were performed using the Pearson’s chi-squared test, whereas the independent samples t-

test was used to identify differences in quantitative variables between the two types of hospitals. Pearson's correlation coefficient was used to estimate the association of the percent of "always" responses for both nurse and physician communication with the percent of patients who reported "always" being provided information about new medications. Multiple regression analysis was performed to identify correlates of medication communication, while adjusting for potential confounding effects. The independent variables that were considered were the percent of patients who responded that nurses and physicians "always" communicated, Magnet designation, hospital type, ownership and availability of emergency services, and number of completed surveys. We adopted a "missing at random" assumption regarding non-responders; that is, we assumed that the probability of non-response did not depend on the outcome given the predictors that were included in the final model. All analyses were conducted using p=0.05 as the significance level and performed using STATA 14 for Windows.

Results

Of the 3,420 hospitals included in this analysis, the great majority were acute care (n=2,982, 87.2%) and offered emergency services (n=3,287, 96.1%); 1,409 (41.2%) were voluntary private non-profit hospitals. The overall mean (SD) percent of patients who reported communication about medication was always provided was 63.5% (5.7%). Percentage of patients who perceived that nurses and physicians always communicated well with them was 78.4% (5.2%) and 81.1% (4.7%), respectively. Descriptive characteristics of the hospitals are presented in Table 1. Magnet availability was higher among acute care hospitals (N=299; 10.0%) than critical access hospitals (n=1; 0.2%;

p<0.001). Hospital ownership differed significantly between acute care and critical access hospitals (*p*<0.001). The percentage of proprietary hospitals was higher among acute care (20.7%) than critical access hospitals (3.4%). The difference regarding the availability of emergency services between the two types of hospitals was not important from a clinical perspective (Availability of emergency services: 95.7% and 98.9% for acute care and critical access hospitals, respectively). Medication, nurse, and physician communication ratings were somewhat higher among critical access hospitals (Mean [*SD*] %: 67.7 [5.4], 82.1 [4.2], and 84.9 [4.3], respectively) compared to acute care hospitals (Mean [*SD*] %: 62.9 [5.5], 77.8 [5.1] and 80.5 [4.6], respectively; *p*<0.001 for all types of communication).

Both nurse and physician communication were strongly positively associated with medication communication (*r* = 0.819, *p*<.001; *r*= 0.722, p<.001, respectively). The correlation between medication communication and nurse communication was somewhat stronger than the corresponding correlation between medication and physician communication.

Results from the simple (i.e., univariable) regression models are shown in Table 2. Both nurse and physician communication were positively associated with medication communication (mean increase [95% CI] in medication communication per 10% increase in nurse and physician communication: 9.1% [8.9%, 9.3%] and 8.7% [8.5%, 9.0%], respectively). There was no evidence of different medication communication between hospitals with and without Magnet designation (*p*=.322). The average medication communication was higher in physician-owned hospitals than in voluntary non-profit private hospitals (mean difference [95% CI]: 8.6% [6.8%, 10.5%]).

Unavailability of emergency services, smaller number of completed surveys, and critical access (vs. acute care) hospitals were associated with higher medication communication (mean difference [95% CI]: 6.2% [5.2%, 7.2%], 4.4% [3.9%, 4.8%], and 4.8% [4.2%, 5.3%], respectively; $p<.001$ for all the corresponding differences).

The multivariable analysis is shown in Table 3. The model was significant and explained about 70% of the variability in medication communication [$R^2=.704$, $R^2_{adj}=.703$, $F(14, 3405)=578.8$, $p<.001$]. The estimated association of nurse and physician communication with medication communication remained significant in the multivariable analysis (adjusted mean increase [95% CI] with an increase in medication communication per 10% increase in nurse and physician communication: 7.0% [6.7%, 7.3%] and 2.7% [2.3%, 3.1%], respectively; p<.001 for both nurse and physician communication); however, the association with physician communication was significantly attenuated. The nurse communication association with medication communication was significantly stronger than the corresponding physician and medication communication association ($p<.001$). Similar to the univariable analysis, there was no evidence for an association between Magnet designation and medication communication (adjusted mean difference [95% CI] between hospitals with and without Magnet designation: -.2% [-.6%, .2%], $p=.308$). Two hospital ownership types were significant in the multivariable model and included those federally owned ($p<.001$) and those owned by physicians ($p=.001$). However, the corresponding mean differences were not clinically important (adjusted mean difference: <2.5% for both ownerships). Additionally, in contrast to the univariable analysis, the associations of unavailability of emergency services, smaller number of completed surveys, and critical access (vs.

acute care) hospitals to medication communication were negligible (adjusted mean differences [95% CI]: 0.8% [0.2%, 1.3%], 0.5% [0.2%, 0.9%], and 0.4% [-0.02%, 0.8%], respectively). Finally, there was no evidence for interaction between hospital type and nurse (*p*=.589) or physician (*p*=.160) communication.

Discussion

Our study is the first study to date to use the HCAHPS survey to model patients' experiences with their hospital care, using patient perceptions of provider and system characteristics as correlates of perceptions of medication communication. Patient perceptions of nurse and physician communication were important correlates of their perceptions of medication communication in both univariable and multivariable models. Nurse communication was more strongly associated with medication communication than physician communication. These findings call attention to the important contribution of nurse communication to medication communication, and highlight opportunities for nurses and physicians to better partner in efforts to improve medication communication. Manary et al. (2013) found that patient-reported measures are strongly correlated with better patient outcomes and largely represent nurse and physician communication-based care. Our results support this finding in that perceptions of both nurse and physician communication are significantly related to perceptions of medication communication. This underscores the need to provide clear and consistent communication about medications for patients. Blanden and Rohr (2009) reported that incomplete medication side effect discussions may affect patients' satisfaction with care.

Surprisingly, we did not find Magnet designation to be a significant correlate of medication communication in both univariable and multivariable analysis. Our findings

differ from those using the 2010 HCAHPS survey in which there were differences in HCAHPS survey results between Magnet and non-Magnet-designated hospitals (Stimpfel, Sloane, McHugh, & Aiken, 2015). However, that study excluded federal hospitals from their analysis, which we found to be a significant predictor of medication communication in our study. Despite Magnet designation lacking significance, nursing communication was a significant predictor, with ratings of nurse communication linearly related to ratings of medication communication. It is likely that the Magnet program has led to improved nursing practice even in hospitals not designated as Magnet. Furthermore, becoming a Magnet-designated hospital requires several years of preparation. Though many of the hospitals were not Magnet-designated, it is possible that some of these hospitals were on the path to this designation. Kutney-Lee and colleagues (2015) found that hospitals on the path to become Magnet hospitals showed improved work environments, with decreased surgical mortality and failure-to-rescue rates compared with those not in the pursuit of Magnet. The Magnet program, along with changes in reimbursement with value-based purchasing and public reporting of HCAHPS survey results, likely has created a system-wide culture of change.

Another interesting finding was the significant contribution of physician-owned hospitals in the model. Siddiqui and colleagues (2014) also found an association between physician-owned hospitals and better HCAHPS scores. These hospitals tend to be specialty hospitals, which are a unique subset of acute care hospitals. The services provided in these hospitals tend to be very specific, such as “heart care” or “orthopedic care,” and therefore the care is more focused and the same services are consistently delivered. Such specialization also suggests that medications prescribed in

these settings might be consistent from patient to patient, and therefore the staff might be better versed in communicating about the condition-specific medications.

Using national data allows us to model provider and hospital characteristics representative of hospitals across the U.S. Furthermore, by using these large datasets, we are able to have more precise estimates and, with relatively narrow confidence intervals, enhance statistical conclusion validity. The significant contribution of survey response rates in the model further supports guidance by CMS suggesting that survey response rates fewer than 300 over a rolling 12-month period have reduced reliability (Centers for Medicare & Medicaid Services, 2015a); however the observed mean difference of 300 or more completed surveys versus 100-299 completed surveys was small (0.5%) and may not be clinically meaningful. Achieving this target number may not always be possible, especially in smaller hospitals with fewer discharges. The contribution of survey response rate and number of completed surveys could suggest some non-response bias in the observed findings; however, both of these variables contributed little to the explained variance in medication communication. A previous concern was that hospital-level data do not account for individual patient characteristics that may result in varying HCAHPS survey responses. Such patient characteristics include health status and race/ethnicity/language, education, and age (Elliott et al., 2009); however, recent evidence suggests that these patient-level characteristics are not confounders and that results with and without these adjustments are similar (Cleary, Meterko, Wright, & Zaslavsky, 2014). Therefore, the present hospital-level data, already adjusted for patient mix, are likely representative of patients' perceptions of the hospital experience, regardless of individual patient characteristics. The cross-sectional nature

of this study does not permit inferences of causality. Prospective study of nurse communication and physician communication and understanding of specific components that lead to better medication communication is needed.

Importantly, this study found significant relationships between patients' perceptions of nurse and physician communication and the explanations they receive about their medications while in the hospital. High-quality patient care is likely to be reflected in patients' perceptions of the care experience, including perceptions of interactions with the healthcare team and the more technical components of care, such as medication administration.

Although some hospital characteristics were important, the primary correlates were healthcare providers' communication. These results should be used to inform intervention development focused on improving provider communication for both nurses and physicians with regard to medications. Such data can inform future intervention work to train nurses, physicians, and other healthcare providers in patient-centered communication and communicating about medications in ways that patients easily understand and are meaningful to them.

HCAHPS measures can be used to guide quality improvement efforts, although more research is needed to understand actual communication behaviors that are more highly associated with how patients perceive listening, courtesy and respect, and explaining things in a way they understand. Furthermore, it is necessary to understand how communication facilitates explanations about medications that assist patients not only in understanding their medications while in the hospital, but in managing their medications at home.

Many of the HCAHPS survey items give actionable information, that is, they can be used to enhance provider skills in communicating, such as clearly explaining things to patients. These items can be used for provider communication training to provide feedback on the occurrence and frequency of certain communication behaviors. Furthermore, given the results obtained in this study, provider communication and medication communication are areas that warrant focused intervention.

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Conflict of Interests

The Authors declare that there is no conflict of interest.

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Figure 1. Hypothesized relationships of patient perceptions of healthcare provider and system factors with medication communication

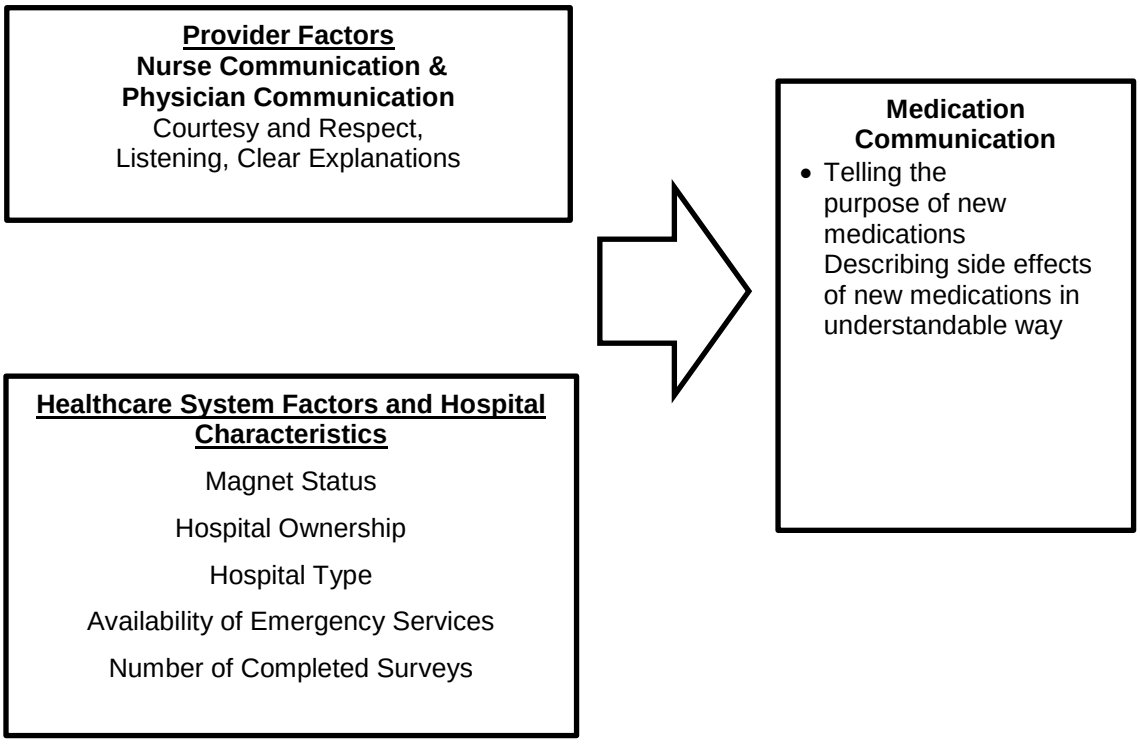

Table 1. Descriptive characteristics of the provider population under study, both by type and overall.

	Overall	Hospital type		
		Acute Care Hospitals	Critical Access Hospitals	
	N (%)	n (%)	n (%)	p-value
Magnet				<0.001
No	3120 (91.2)	2683 (90.0)	437 (99.8)	
Yes	300 (8.8)	299 (10.0)	1 (0.2)	
Hospital ownership				<0.001
Government - Federal	29 (0.8)	28 (0.9)	1 (0.2)	
Government - Hospital District or Authority	306 (8.9)	252 (8.5)	54 (12.3)	
Government - Local	228 (6.7)	172 (5.8)	56 (12.8)	
Government - State	48 (1.4)	45 (1.5)	3 (0.7)	
Physician	37 (1.1)	36 (1.2)	1 (0.2)	
Proprietary	632 (18.5)	617 (20.7)	15 (3.4)	

Voluntary non-profit - Church	313 (9.2)	284 (9.5)	29 (6.6)	
Voluntary non-profit - Other	418 (12.2)	371 (12.4)	47 (10.7)	
Voluntary non-profit - Private	1409 (41.2)	1177 (39.5)	232 (53.0)	
Emergency services				0.001
No	133 (3.9)	128 (4.3)	5 (1.1)	
Yes	3287 (96.1)	2854 (95.7)	433 (98.9)	
Number of completed surveys				<0.001
300 or more	2732 (79.9)	2646 (88.7)	86 (19.6)	
Between 100 and 299	688 (20.1)	336 (11.3)	352 (80.4)	

Table 2. Univariable Regression Analysis: Predictors of Medication Communication. Results from linear regression models.

	Univariable analysis		
	b*	**95% CI**	**p-value**
% of nurses always communicated well			
per 10% increase	9.125	(8.911, 9.340)	<0.001
% of physicians that always communicated well			
per 10% increase	8.737	(8.456, 9.018)	<0.001
Magnet			
No	0	-	-
Yes	-0.344	(-1.024, 0.337)	0.322
Hospital ownership			
Voluntary non-profit - Private	0	-	-
Government - Federal	0.957	(-1.120, 3.034)	0.366
Government - Hospital District or Authority	0.869	(0.171, 1.568)	0.015
Government - Local	0.44	(-0.350, 1.231)	0.275
Government - State	-0.72	(-2.345, 0.905)	0.385
Physician	8.676	(6.832, 10.519)	<0.001
Proprietary	-1.038	(-1.568, -0.508)	<0.001
Voluntary non-profit - Church	-0.754	(-1.446, -0.063)	0.033
Voluntary non-profit - Other	-0.214	(-0.831, 0.402)	0.496

Emergency services			
No	0	-	-
Yes	-6.177	(-7.151, -5.203)	<0.001
Number of completed surveys			
300 or more	0	-	-
Between 100 and 299	4.378	(3.921, 4.836)	<0.001
Hospital type			
Acute Care Hospitals	0	-	-
Critical Access Hospitals	4.815	(4.262, 5.369)	<0.001

* Estimated mean difference

Table 2. Multivariable Regression Analysis: Predictors of Medication Communication. Results from linear regression models.

	Multivariable analysis		
	b*	**95% CI**	**p-value**
% of nurses always communicated well			
per 10% increase	7.005	(6.684, 7.326)	<0.001
% of physicians that always communicated well			
per 10% increase	2.713	(2.360, 3.067)	<0.001
Magnet			
No	0	-	-
Yes	-0.198	(-0.580, 0.183)	0.308
Hospital ownership			
Voluntary non-profit - Private	0	-	-
Government - Federal	2.364	(1.208, 3.519)	<0.001
Government - Hospital District or Authority	-0.039	(-0.432, 0.355)	0.847
Government - Local	0.149	(-0.295, 0.593)	0.51
Government - State	0.321	(-0.581, 1.223)	0.486
Physician	1.742	(0.680, 2.804)	0.001
Proprietary	0.224	(-0.081, 0.530)	0.15
Voluntary non-profit - Church	-0.175	(-0.559, 0.210)	0.373
Voluntary non-profit - Other	-0.139	(-0.482, 0.203)	0.425
Emergency services			
No	0	-	-
Yes	-0.767	(-1.348, -0.186)	0.01
Number of completed surveys			

300 or more	0	-	-
Between 100 and 299	0.517	(0.178, 0.855)	0.003
Hospital type			
Acute Care Hospitals	0	-	-
Critical Access Hospitals	0.382	(-0.018, 0.782)	0.062

* Estimated mean difference